SIEMENS

COM32

Installation & Operation Manual

⚠ DANGER

Electrical equipment contains hazardous voltages and high speed moving parts.

Can cause death, serious injury or property damage.

See safety instruction contained herein. **Restrict use to qualified personnel.**

The use of unauthorized parts in the repair of the equipment or tampering by unqualified personnel will result in dangerous conditions that can cause death, serious injury or property damage.

IMPORTANT

The information contained herein is general in nature and not intended for specific application purposes. It does not relieve the user of responsibility to use sound practices in application, installation, operation, and maintenance of the equipment purchased. Siemens reserves the right to make changes at any time without notice or obligations. Should a conflict arise between the general information contained in this publication and the contents of drawings or supplementary material or both, the latter shall take precedence.

QUALIFIED PERSONNEL

For the purposes of this manual and product labels, "qualified personnel" is one who is familiar with the installation, construction, or operation of the equipment and the hazards involved. In addition, s/he has the following qualifications:

(a) **is trained and authorized** to energize, de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.

(b) **is trained** in the proper care and use of protective gear equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety procedures

(c) **is trained** in rendering first aid.

SUMMARY

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation, or maintenence. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local the sales office.

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Siemens maintains control of all specifications for the SEAbus and SEAbus Plus protocols. A modification to a protocol for any type of device must be approved by Siemens Energy & Automation, Inc. to guarantee compatibility. Any changes made must be backward compatible so that existing products can coexist on the communications bus without having to support the newer features of the protocol

Siemens continuously strives to ensure backward compatibility, reliability, and easy implementation of both protocols to meet current market communications requirements. Siemens therefore reserves the right to make improvements including changes to specifications at any time without notice or obligation.

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1 COM32 Features

- 1200, 2400, 4800 or 9600 baud operation.
- Full electrical isolation between RS-485 and RS-232 to 500V.
- Works directly with Siemens SCADA software or with other proprietary software.
- Compact, attractive package.
- May be used with direct computer connection or with modems — switch allows enabling of the receive by carrier detect option.
- RS-485 transmit enable may be controlled automatically or by the RS-232 RTS line.
- Powered from AC adapter (included).

1.1 Introduction

When an RS-232 communications line is connected to an RS-485 communications bus, there are several basic problems:

1. RS-232 is fundamentally a duplex standard. Separate signals can be transmitted and received simultaneously. RS-485 is strictly simplex. Signals can only be transmitted in one direction at a time. When interfacing between an RS-232 device and an RS-485 device, there must be some method of controlling whether the RS-232 device listens or transmits onto the bus. The COM32 provides two ways of doing this. The first is the standard approach of using the RS-232 RTS signal to provide directional control for the COM32 module. This works fine provided that the RTS signal is available, and the computer software being run on the PC supports this method of operation. In many cases, these conditions are not met.

   The COM32 is unique in that it also supports an "automatic" mode which allows it to detect the change of RS-232 devices from a listen mode to transmit mode. All the timing functions required to do this are handled automatically for rates of 1200 to 9600 baud.

2. RS-485 loops are generally quite long, and they often run through electrically noisy environments. The risk of exposure to transient voltage surges and spikes on an RS-485 line is substantially higher than on an RS-232 line. The COM32 module uses isolation between the RS-232 and RS-485 sections to protect the computer equipment from damage.

The operational block diagram for the COM32 is provided in **Figure 1.1.1**. **Figure 1.1.2** shows the physical features of the COM32.

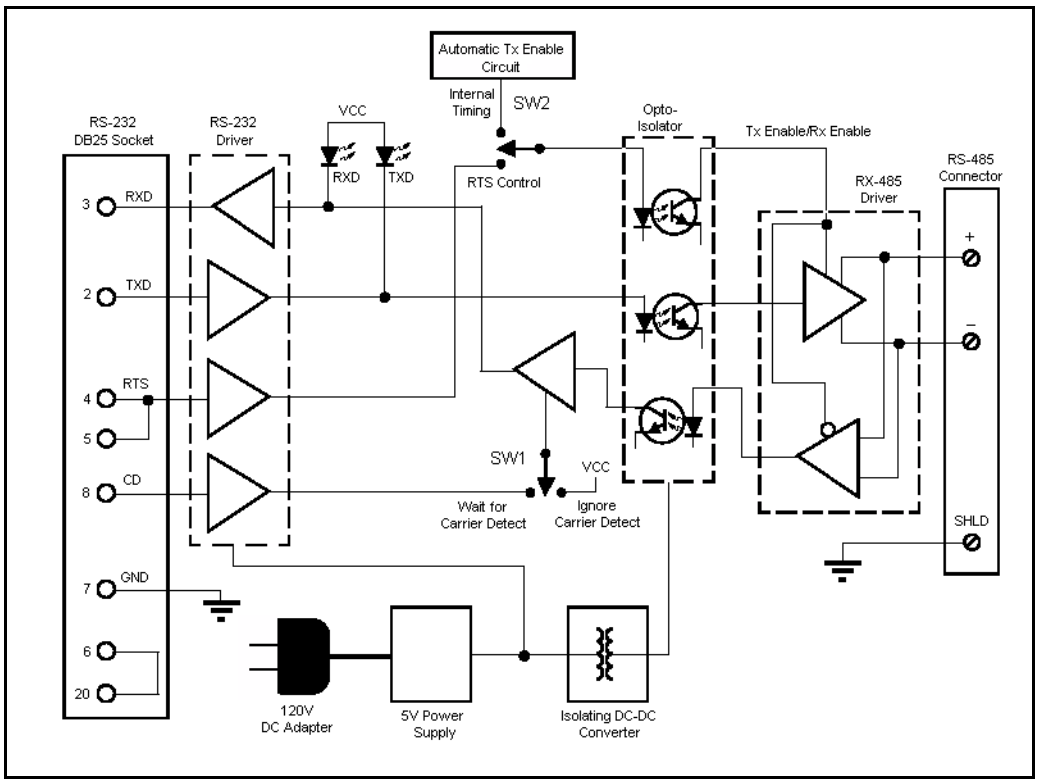


Figure 1.1.1 COM32 Operational Block Diagram

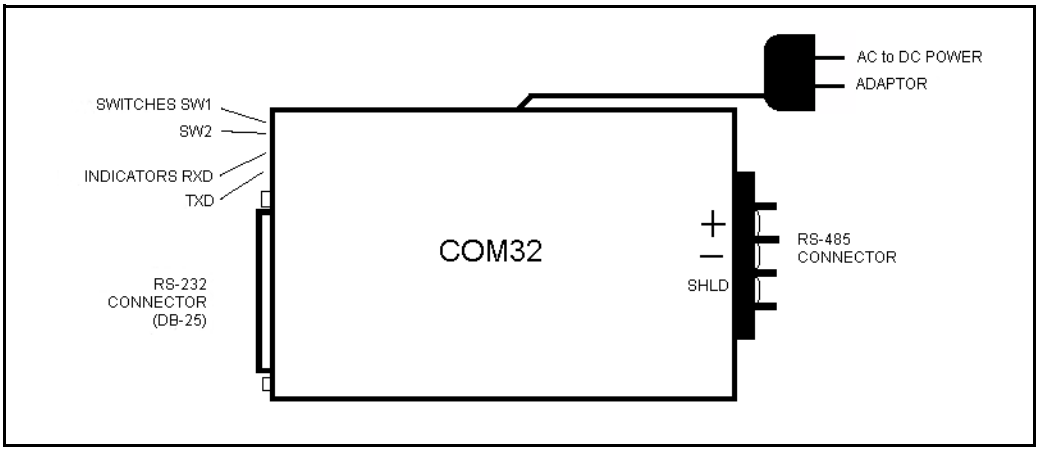


Figure 1.1.2 COM32 Features

2 Installation and Operation

2.1 Installation with Direct Connection to a Computer

Since the COM32 device is configured as DCE (data communications equipment) it may be connected directly to the serial port of a standard PC, which will be DTE (data terminal equipment). As shown in **Figure 2.1.1**, the DB-23 connector on the COM32 unit is connected directly (wires run straight through and do not cross) to the DB-23 connector of the computer.

To make the connection between the COM32 and the RS-485 bus, use a shielded twisted-pair cable. Make the RS-485 connections to the "Data +" and "Data -" terminals of the COM32. Ensure that the polarity is correct.

When running WinPM software on a PC, in a direct connect mode, the RTS line of the RS-232 will control the RS-285 data direction. The switch settings on the COM32 for direct connection should be as follows:

SW-1: OFF (ignore carrier detect)

SW-2: ON (Automatic Flow Control)

Refer to **Figure 2.1.1** for more information.

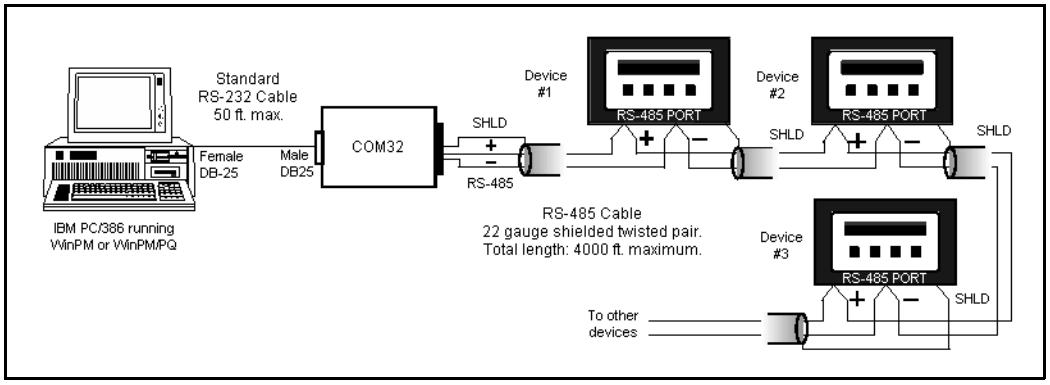


Figure 2.1.1 COM32 Direct Connection to a Computer

2.2 Installation with Connection to a Modem

Figure 2.2.1 shows connection of the COM32 with a modem. Since both the COM32 unit and the modem are configured as DCE (data communications equipment) the interface between the two must be done using a null modem cable. A null modem cable swaps certain pins between the two ends.

NOTE

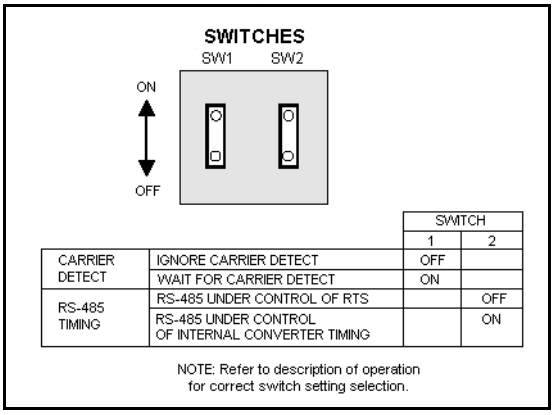
When using a dial-up modem to communicate with 4000 or 9000-series meters, Siemens recommends using the COM128 instead of the COM32.

The DB-25 connector on the COM32 converter is connected to the DB-25 connector of the modem using the null modem cable. A shielded twisted-pair

cable is used to make the RS-485 connections to the "Data +" and "Data -" terminals of the COM32. Ensure that the polarity is correct.

If the converter is being used to allow the modem to monitor an active RS-485 data loop, the converter must be set to pass data to the modem only after the carrier has been detected, otherwise the modem will not answer. For connection with a modem the switch settings should be as follow:

SW-1: ON (wait for carrier detect)



		SWITCH 1	SWITCH 2
CARRIER DETECT	IGNORE CARRIER DETECT	OFF	
	WAIT FOR CARRIER DETECT	ON	
RS-485 TIMING	RS-485 UNDER CONTROL OF RTS		OFF
	RS-485 UNDER CONTROL OF INTERNAL CONVERTER TIMING		ON

NOTE: Refer to description of operation for correct switch setting selection.

Figure 2.2.1 COM32 Configuration

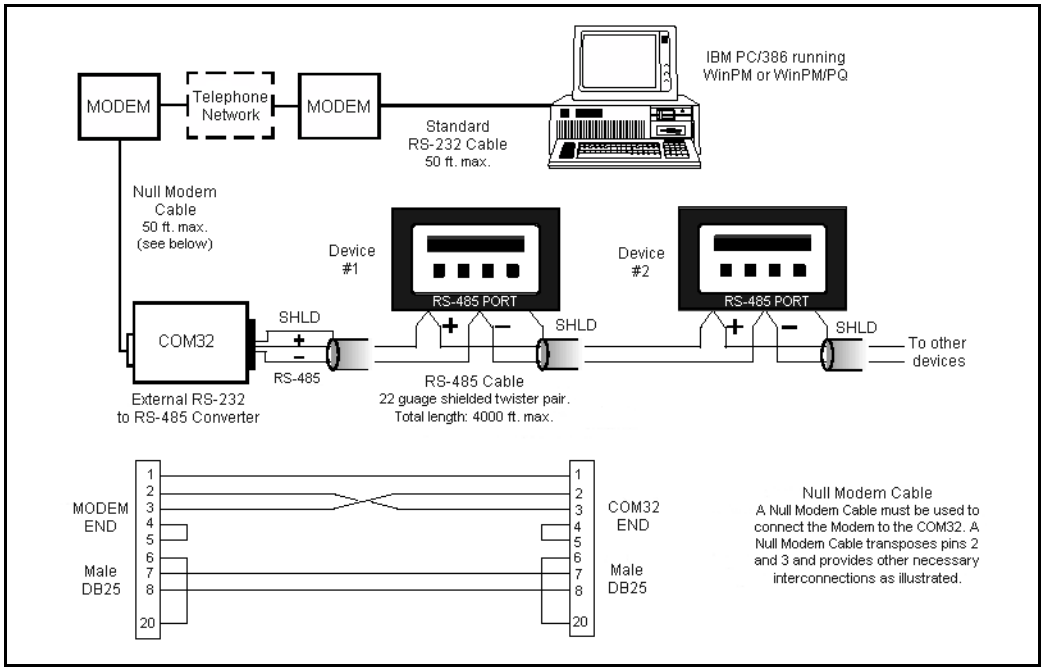

MODEM
Telephone Network
MODEM
IBM PC/386 running WinPM or WinPM/PQ
Standard RS-232 Cable 50 ft. max.
Null Modem Cable 50 ft. max. (see below)
Device #1
Device #2
RS-485 PORT
RS-485 PORT
COM32
SHLD
RS-485
SHLD
SHLD
To other devices
External RS-232 to RS-485 Converter
RS-485 Cable 22 guage shielded twister pair. Total length: 4000 ft. max.
MODEM END
Male DB25
COM32 END
Male DB25
Null Modem Cable
A Null Modem Cable must be used to connect the Modem to the COM32. A Null Modem Cable transposes pins 2 and 3 and provides other necessary interconnections as illustrated.

Figure 2.2.2 COM32 Connection to a Modem

Switch SW-2 controls whether the RTS signal controls the RS-485 bus, or if the RS-485 bus is controlled automatically. If the software does not support RTS control, or the modem being used does not pass this signal, SW-2 must be sent to the automatic internal timing mode. The two possible settings of SW-2 are as follows:

SW-2: OFF (RTS controls the RS-485 bus)

SW-2: ON (RTS is not available: the converter uses internal timing to control the RS-485 bus)

Refer to **Figure 2.2.1** for more information.

2.3 RS-485 Connections

RS-485 communications allows multiple devices to be connected on the same bus. Up to 32 devices can be connected on a single RS-485 bus, which consists of a shielded twisted pair cable. The overall length of the RS-485 cable connecting all devices cannot exceed 4000 ft. (1219 m).

A COM32 is required in order to connect an RS-485 communications bus to a computer or other RS-232 equipped device.

General Bus Wiring Considerations

Devices connected on the bus, including the COM32 and other instrumentation, must be wired as follows:

1. Use a good quality shielded twisted pair cable for each RS-485 bus. It is recommended that AWG 22 (0.6 mm) or larger conductor size be used.

2. Ensure that the polarity is correct when connecting to the RS-485 port (+) and (-) terminals of each device.

3. The shield of each segment of the RS-485 cable must be connected to ground at one end only.

⚠ CAUTION

Do not connect ground to the shield at both ends of a segment. Doing so allows ground loop currents to flow in the shield, inducing noise in the communications cable.

4. Cables should be isolated as much as possible from sources of electrical noise.

Recommended Topologies

Devices on an RS-485 bus are connected in a point-to-point configuration, with the (+) and (-) terminals of each devices connected to the associated terminals on the next device. This is illustrated in **Figure 2.3a**.

While there are many topologies that can be used to connect devices on an RS-485 communication bus, the two recommended methods are the straight-line and loop topologies.

Straight-Line Topology

The straight-line wiring method is illustrated in **Figure 2.3a**.

Each end point of the straight-line bus must be terminated with a 1/4 watt resistor. These termination resistors reduce signal reflections which may corrupt data on the bus.

Termination resistors are connected between the (+) and (-) terminals of the device at each end of the bus. This device can include either a converter or any other instrument. The value of the resistor should match the line impedance of the cable being used. For AWG 22 shielded twisted pair cable, values between 150 and 300 ohms are typical. Consult the cable manufacturer's documentation for the exact impedance of your cable.

Loop Topology

The loop wiring method is illustrated in **Figure 2.3a**. The COM32 can exist at any position on the RS-485 bus.

One advantage of the loop topology is that a single-open circuit fault condition anywhere on the loop will not result in the loss of communication between the computer station and any of the remote devices.

The loop topology does not require termination resistors at any point on the bus.

Connection Methods to Avoid

Any device connection that causes a branch in the main RS-485 bus should be avoided This includes star and tee (T) methods. Refer to **Figure 2.3b** for examples. These wiring methods cause signal reflections that may cause interference.

NOTE

At any connection point on the RS-485 bus, no more than two (2) cables should be connected. This includes connection points on instruments, converters, and terminal strips. Following this guideline ensures that star and tee connections are avoided.

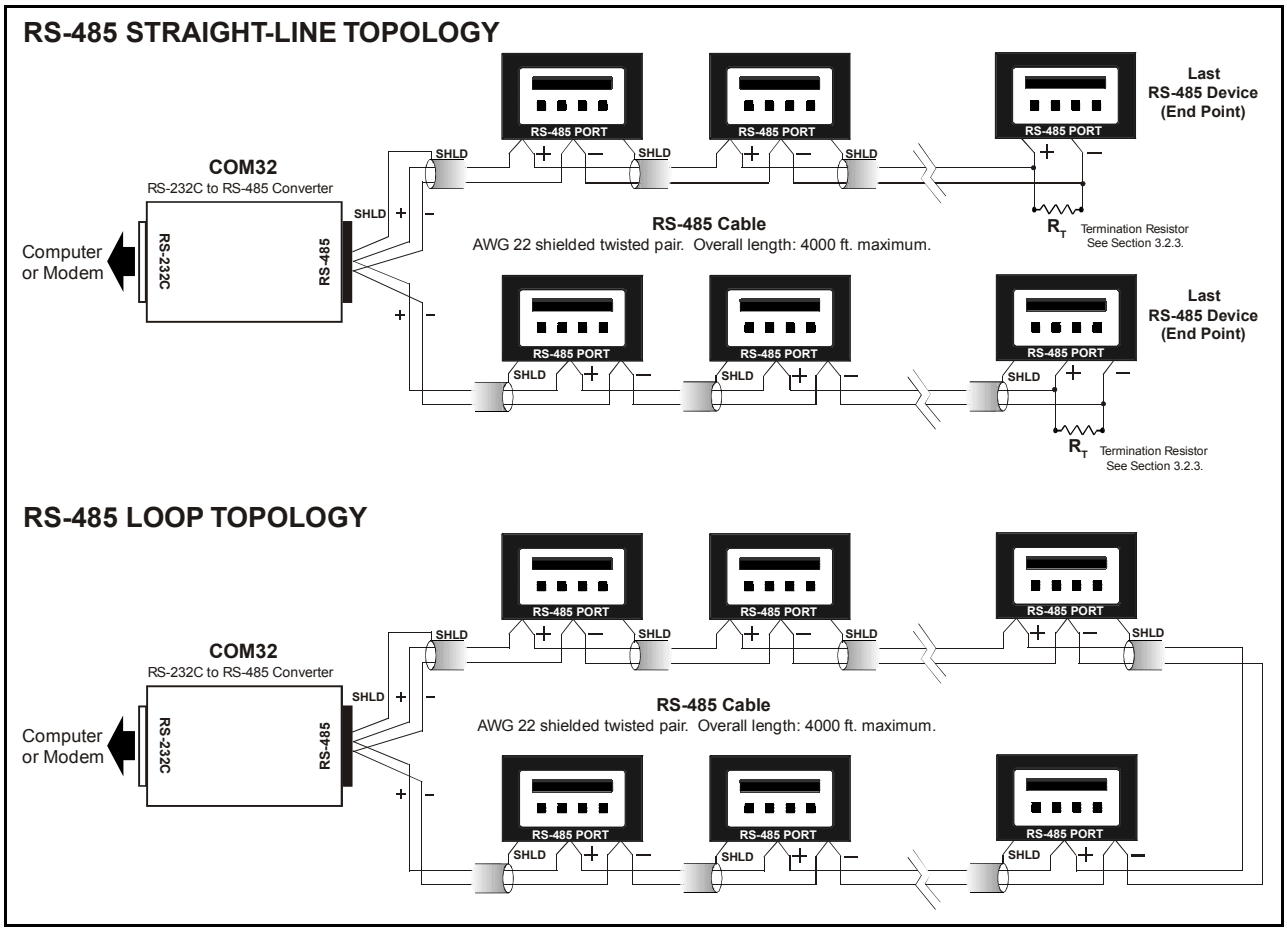


Figure 2.3a RS-485 Straight-Line and Loop Topologies

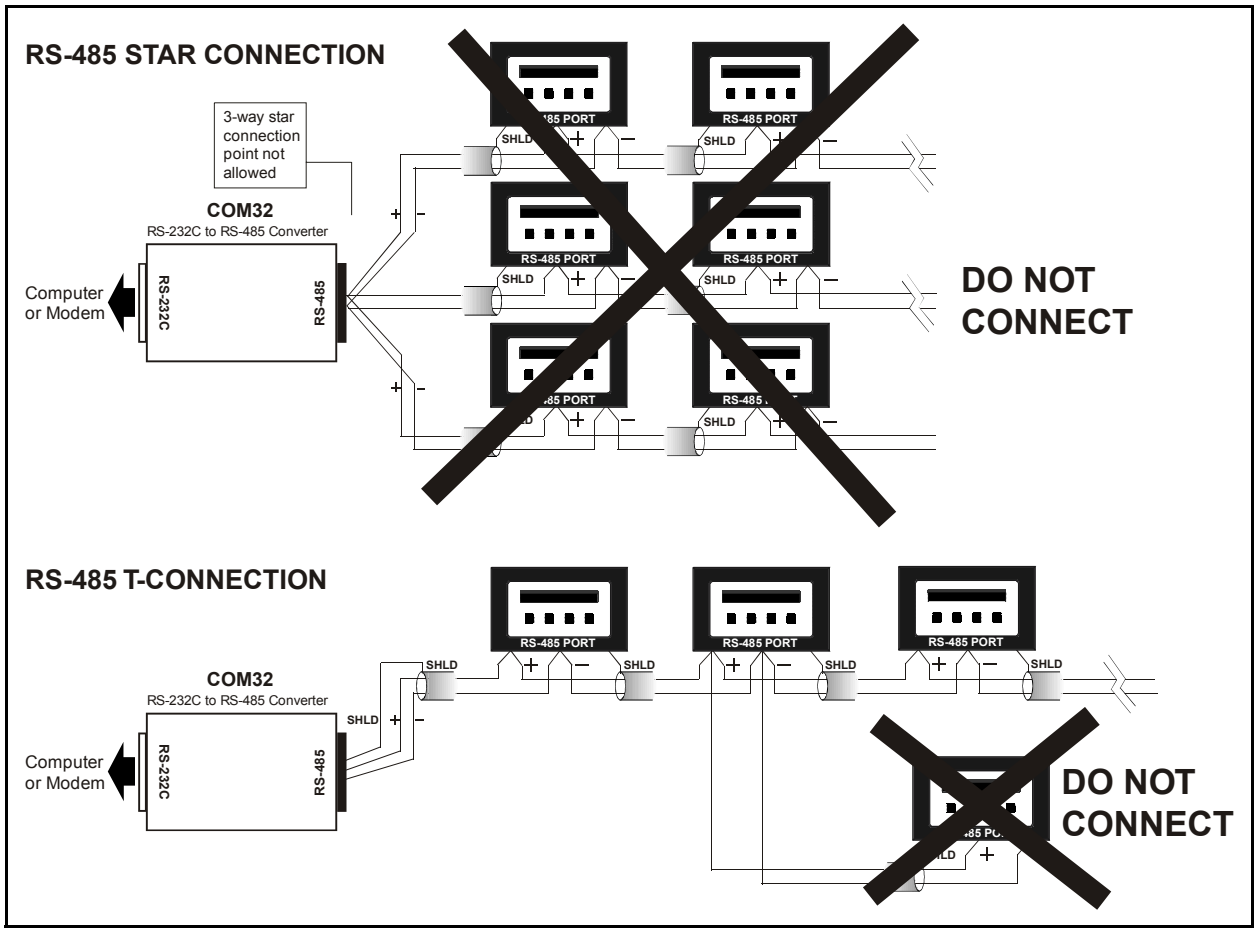


Figure 2.3b RS-485 Topologies to Avoid

3 Power Connections

The wall adapter should be plugged into a standard 120 VAC outlet. When powered, the TXD and RXD indicators should come on. As data is passed through the converter, the lights will flicker.

-NOPWR (No Power) Option

A COM32 with the -NOPWR option must be powered by an external source rated between 7VDC and 12VDC. It is recommended that a power supply adapter with an output of 9VDEC at 500mA be used. The COM32 with this option is supplied with a pair of leads with spade connector terminations which extend form the side of the enclosure (see **Figure 3.1.1**).

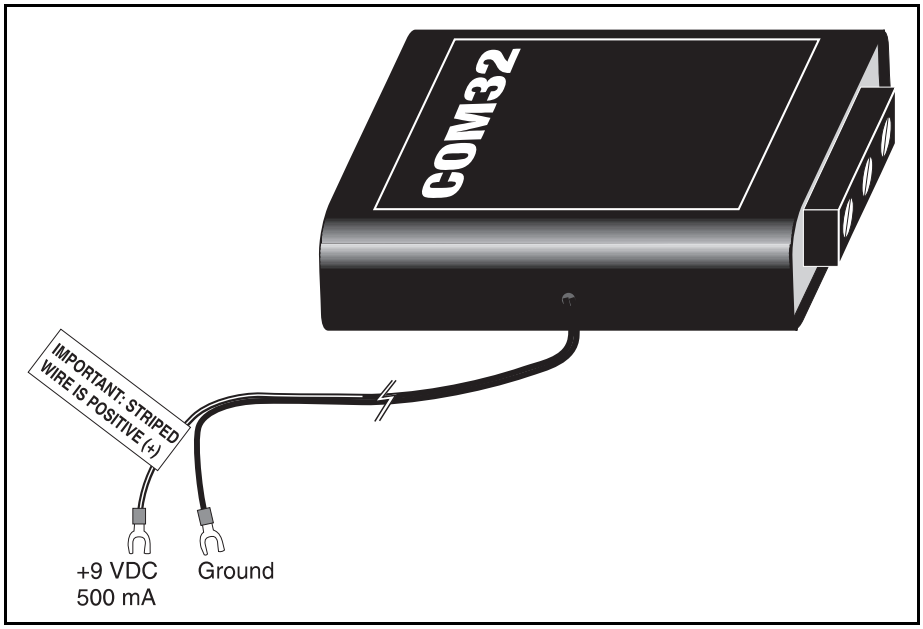


Figure 3.1.1 -NOPWR Option

-UNI Option

The -UNI option is a universal power supply that allows the COM32 to be powered from any standard international voltage and frequency. Refer to **Figure 3.1.4** for more information.

The "table-top" design of the supply allows it to be positioned a top any flat surface. A standard IEC 3-pin socket is provided for connection of an appropriate power cord (not supplied) to match the configuration of the power outlet. The supply is permanently connected to the COM32.

Specifications

Input Voltage:	90 VAC to 264 VAC
Input Frequency Range:	47 Hz to 440 Hz
Protection:	Internal Fuse
Operating Temperature:	0°C to 40°C (32°F to 104°F)
Storage Temperature:	-40°C to 85°C (-40°F to 185°F)

Standards Compliance

The UNI option is CSA, UL, and VDE approved.

-IND Option

The -IND option is a universal power supply that allows the COM32 to be powered from any standard international voltage and frequency. The power supply is designed for industrial applications where it can be mounted on the wall or door of a cabinet.

Specifications

Input Voltage:	85 VAC to 264 VAC (110 VDC to 340 VDC)
Input Frequency Range:	47 Hz to 440 Hz
Protection:	Internal Fuse
Operating Temperature:	0°C to 50°C (32°F to 122°F) relative humidity, non-condensing
Storage Temperature:	-20°C to 75°C (-4°F to 167°F)

Standards Compliance

The IND option is CSA, UL, and VDE approved.

Mechanical and Mounting Dimensions

Dimensions in inches except where otherwise indicated. Refer to **Figure 3.1.4**.

Connections

The IND power supply must be connected to a dedicated fused feed voltage source. The COM32 is connected to the IND supply using the bare-end wires extending from the COM32 enclosure. Refer to **Figure 3.1.3** for more information.

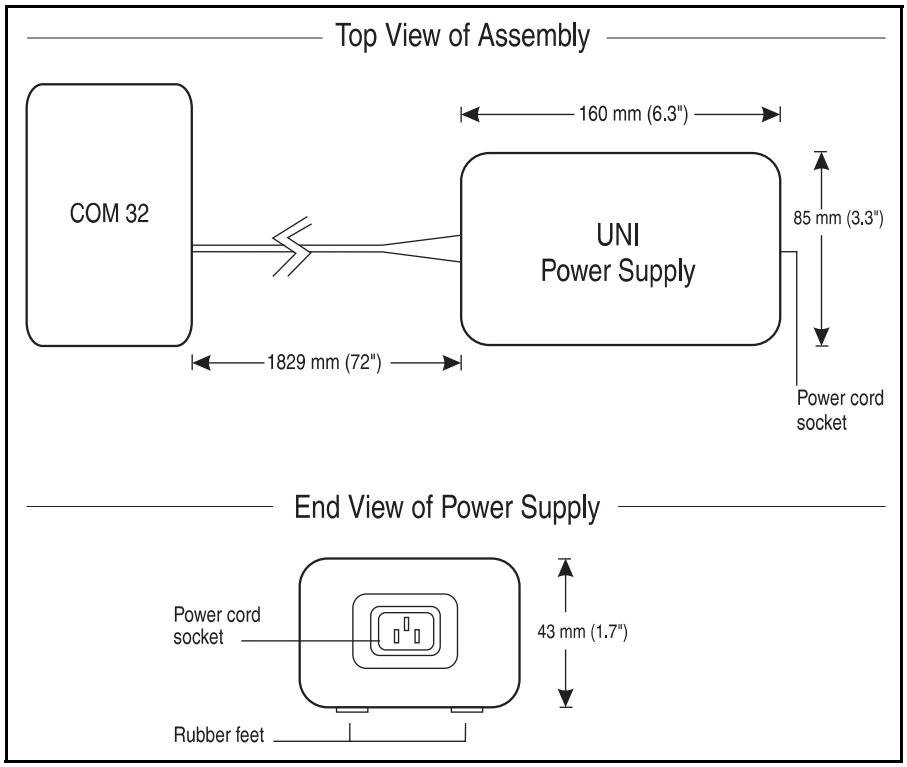


Figure 3.1.2 -UNI Option (Universal P/S)

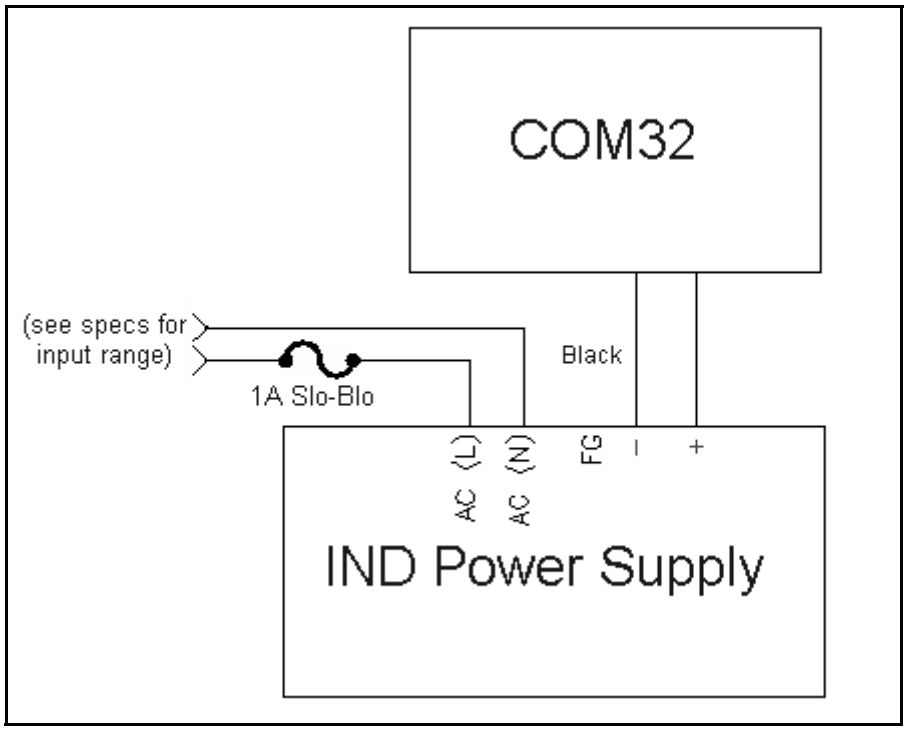


Figure 3.1.3 Connecting the -IND Power Supply

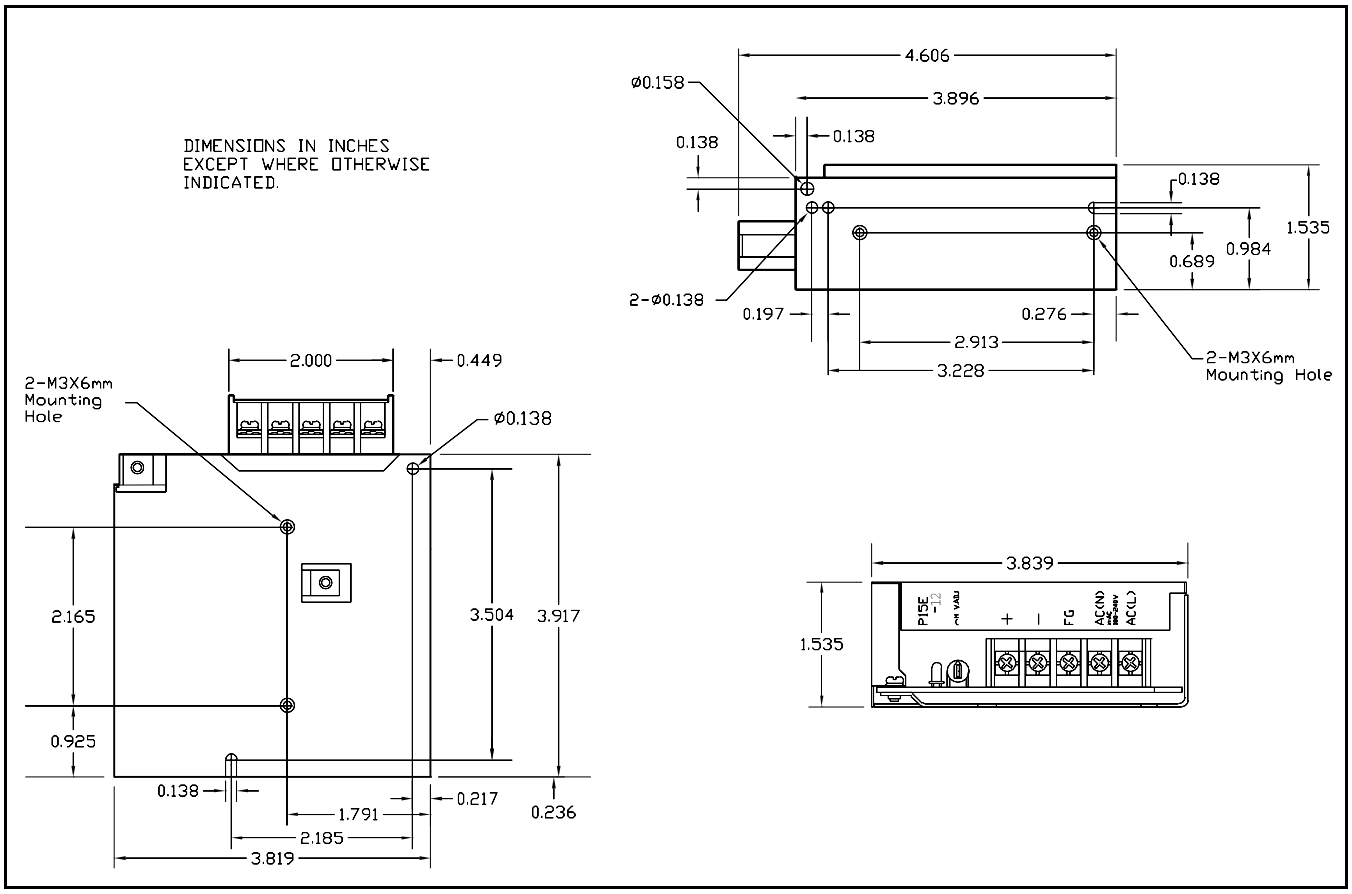


Figure 3.1.4 -IND Option (Industrial P/S)

4 Technical Specifications

Electrical Ratings

Isolation:	500 V between RS-232 and RS-485 ports
Power Supply:	Standard 9VDC @ 500 mA (120 VAC adapter supplied) Alternate: 9 VDC @ 500 mA (220 VAC adapter)
Operating Temperature:	0°C to 50°C (32°F to 122°F) ambient air
Storage Temperature:	-30°C to 70°C (-22°F to 158°F)
Humidity:	5 to 95 percent, non-condensing
Shipping Weight:	COM32: 0.24 kg; 8 oz. COM32 with standard power supply: 0.47 kg; 1lb. COM32 with alternate power supply: 0.63 kg; 1 lb. 6 oz.
Shipping Carton:	30 cm x 25 cm x 15 cm (11.8" x 9.8" x 5.9")

Features

Baud Rates Supported:	1200, 2400, 4800, 9600
RS-232 Ports:	One (Female DB-25)
RS-485 Ports:	One screw-down terminal blocks, each with (+), (-), and shield (SHLD) terminals

NOTE

RS-485 port terminals all pass ANSI/IEEE C37.90A-1989 surge withstand and fast transient tests.

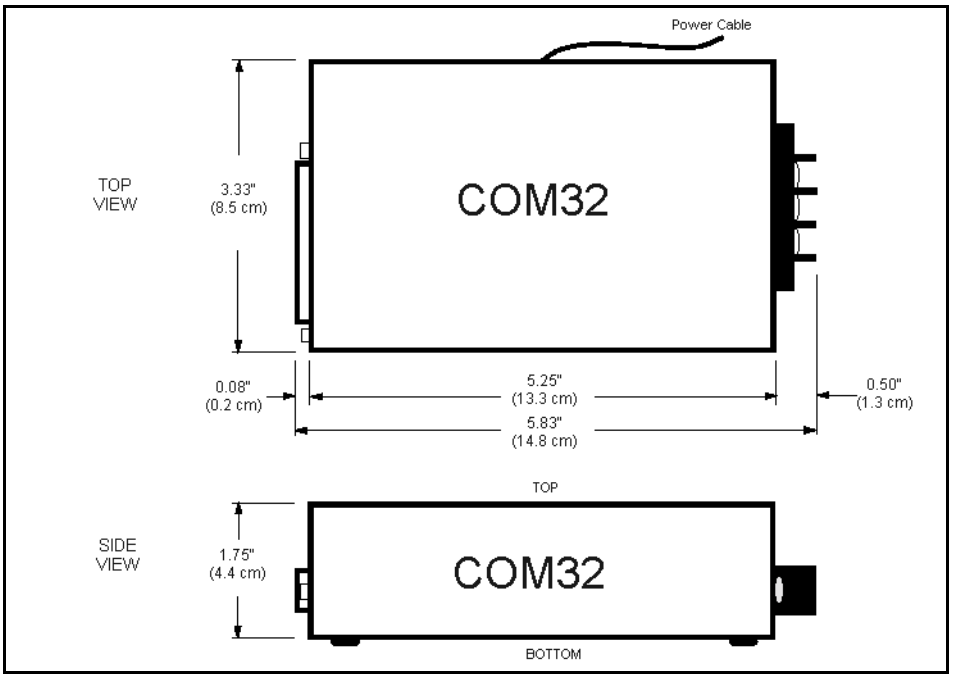


Figure 4.1.1 COM32 Mechanical Dimensions

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